Original Article

Effect of Dexmedetomidine on Blood Loss and Quality of Surgical Field in Functional Endoscopic Sinus Surgery: A Double Blinded Prospective Controlled Study

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Abstract

Background: Functional endoscopic sinus surgery (FESS) is a widely performed operation with one of its major drawbacks being impaired visibility due to excessive bleeding. Controlled hypotension during general anaesthesia for FESS has been shown to improve surgical dissection. This study was carried out with the aim of evaluating the effect of dexmedetomidine on surgical blood loss and quality of surgical field in FESS. **Methodology:** This prospective randomized double blinded controlled study was conducted on 100 patients posted for elective FESS. After obtaining institutional ethical clearance, patients between the ages 18 and 60 yrs belonging to ASA PS I and II, scheduled to undergo elective FESS surgery under general anaesthesia were included in the study. Fifty patients each were sorted into either the study group (Group I/D) receiving dexmedetomidine or control group (Group II/NS) receiving normal saline. The two groups were compared using student's t-test for age, weight, mean arterial pressure, heart rate, amount of blood loss, EtCO2 and SpO2.Chi square analysis and Fisher's exact test were used for analysis of gender, ASA physical status and surgeon's satisfaction after surgery. Statistical significance was determined at $P < 0.05$. **Results:** Both the groups; D and NS were comparable in terms of weight, age, sex and ASA physical status. Mean arterial pressure (MAP) and heart rate (HR) were compared between the two groups at every step of the procedure and dexmedetomidine was shown to produce a drop in both hemodynamic parameters producing stable vital parameters. The average intraoperative blood loss was found to be significantly higher in the control group. Surgeon's satisfaction with the operative experience was also found to be significantly better with the study group than in the control group. **Conclusion:** This study found that dexmedetomidine produces stable blood pressure and heart rate with minimal fluctuations from the baseline during FESS. This hemodynamic stability leads not only to a good patient outcome, but also increases surgeon satisfaction.

Keywords: Controlled hypotension, dexmedetomidine, functional endoscopic sinus surgery, surgeon satisfaction

Introduction

Functional endoscopic sinus surgery (FESS) is a commonly performed procedure in otorhinolaryngology and involves manipulation in the nasal and paranasal sinuses to re-establish sinus ventilation and restore its function.[1] The complex and distinctive anatomy of the head and neck along with the proximity to vital structures such as the base of the brain, eyes, nerves, and blood vessels necessitates a good and clear view for a surgeon during surgery.[2,3] Because the nasal and paranasal sinuses have a rich blood supply, manipulation during surgery can result in excessive bleeding compromising proper field visualization.[4] The ease and success of surgery depends on the clarity of the surgical field, which is related to the heart rate and blood pressure, both of which are in turn affected by anaesthetic techniques and drugs. Hence, one of the accepted techniques employed to minimize perioperative bleeding during FESS is the use of controlled hypotension during general anaesthesia.[5]

Dexmedetomidine hydrochloride is a recently introduced highly specific alpha-2 adrenoreceptor agonist. By

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activating α_2 adrenoceptors, it results in decrease of sympathetic tone, as well as decrease in the hemodynamic and neuroendocrine responses to anaesthesia and surgical intervention. Thus, by causing sedation and analgesia it reduces opioid and anaesthetic requirements. In addition, when used as an anaesthetic adjuvant dexmedetomidine has the ability to maintain stable heart rate and create a controlled reduction in blood pressure.[6] Therefore, dexmedetomidine could be useful in reducing the surgical blood loss and improving the surgical field view during FESS.

The benefits of dexmedetomidine as an analgesic and sedative has been shown in studies by Karaaslan *et al*. and Kaur *et al*.[7,8] Jamaliya *et al*. showed the efficacy of dexmedetomidine as a hypotensive agent.[9] Surgeon satisfaction due to clearer surgical field has been reported by Gupta *et al*., Srivastava *et al*., Frölich *et al*., and Yoo *et al*. in their studies involving dexmedetomidine in FESS.[10-13] In addition, Rayan *et al*. and Shams *et al*. have reported faster emergence time and better modified Aldrete scores with the use of dexmedetomidine during FESS.[14,15]

Objectives

1. To evaluate the effect of dexmedetomidine on surgical blood loss during FESS
2. To assess the quality of surgical field
3. To evaluate hemodynamic stability during general anaesthesia for FESS when given along with dexmedetomidine
4. To assess the recovery characteristics in patients receiving dexmedetomidine.

Materials and Methods

Source of data

This prospective randomized double-blinded controlled study was conducted among 100 patients posted for elective Functional endoscopic sinus surgery (FESS) in Justice K.S. Hegde Hospital Derlakatte, Mangalore, India. The study was conducted from January 2015 to August 2016.

Inclusion criteria

Patients between the ages of 18 and 60 years belonging to ASA PS I and II scheduled to undergo elective FESS surgery under general anaesthesia.

Exclusion criteria

1. Patients' refusal for the study
2. Patients on chronic analgesic or sedative medication
3. Patient with significant cardiovascular disease or other systemic disease
4. ASA III and above
5. Known allergy to drugs
6. Presence of bleeding diathesis
7. Use of any drug which could interfere with the findings of the study.

Data collection

Sample selection was done by independent sample test and randomization by closed envelope method, each arm size was calculated as 50; sample size was 100.

Selection method

Patients were allocated into two groups, I and II, based on randomization method.

Group I: Patients received a loading dose of dexmedetomidine 1 μg/kg infusion in normal saline over 10 min before induction of general anaesthesia and followed by 0.25 μg/kg/h as infusion dose intraoperatively.

Group II: Patients received normal saline (NS) in the same quantity as the study group.

Procedure

- After institutional ethical committee clearance, patients were evaluated during their pre-anaesthetic visit
- Written informed consent was obtained from patients after explaining the procedure to them
- One hundred patients posted for elective FESS were allocated randomly into two groups, I and II, as per the randomization method
- Patients were fasted as per standard protocol and premedicated with tab. ranitidine 150 mg and tab. diazepam (5 mg for less than 50 kg and 10 mg for more than 50 kg) on the previous night and 1hour prior to surgery with sips of water
- After shifting the patient to the operation theatre (OT), electrocardiography (ECG), pulse-oximeter, and noninvasive blood pressure monitor were connected and baseline values were noted
- Intravenous (IV) line was secured with an 18-gauge cannula
- Ringer's lactate or NS was infused at 50–100 ml/hour based on body weight of the patient.
- Group I received the study drug dexmedetomidine at 1 μg/kg IV bolus over 10 min. After completion of loading dose dexmedetomidine infusion at 0.25 μg/kg/h was started
- Group II patients received NS in the similar manner as group I
- Following infusion, general anaesthesia was induced with 2 μg/kg fentanyl IV. After 2 min, IV propofol titrated to loss of verbal response and 0.5 mg/kg atracurium besylate was given for muscle relaxation
- After ventilating with 100% oxygen for 3 min, airway was secured with appropriate size endotracheal tube and cuff was inflated with air and connected to mechanical ventilator to maintain $ETCO_2$ at 30–35 mmHg
- Anaesthesia was maintained with 66% nitrous oxide in oxygen, isoflurane 0.6%, and positive pressure ventilation. Muscle relaxation was maintained with an additional dose of atracurium if Train of Four (TOF) count >2
- Infusion of dexmedetomidine was stopped 10 min prior to end of the surgery.

- At the end of procedure after discontinuing isoflurane, muscle relaxation was reversed with appropriate doses of neostigmine and glycopyrrolate
- Extubation was done once patient was awake, breathing spontaneously, and TOF ratio was 1
- ECG, SpO_2, and $ETCO_2$ were also monitored throughout the procedure
- Patients were then shifted to post anaesthesia care unit (PACU) after the completion of procedure
- After procedure, the total blood loss was measured from the suction apparatus. Cotton swabs were also weighed and compared
- Blood pressure and heart rate were recorded throughout the procedure and in the postoperative ward for half an hour post-surgery
- The quality of surgical field was assessed using a category scale adopted from Fromme *et al*[16]
- Recovery status was assessed by Modified Aldrete score[17]
- Hemoglobin and hematocrit were measured preoperatively and 6 h post procedure
- The patient, surgeon, and the concerned anaesthesiologists were blinded throughout the procedure.

During the study the following parameters were monitored and recorded:

1. Demographic data
2. MAP, SpO_2, and heart rate
3. Assessment of clarity of surgical field using Fromme *et al*. scale
   0, No bleeding
   1, Slight bleeding – no suctioning of blood required
   2, Slight bleeding – occasional suctioning required. Surgical field not threatened
   3, Slight bleeding – frequent suctioning required. Bleeding threatens surgical field a few seconds after suction is removed
   4, Moderate bleeding – frequent suctioning required. Bleeding threatens surgical field directly after suction is removed
   5, Severe bleeding – constant suctioning required. Bleeding appears faster than can be removed by suction. Surgical field severely threatened and surgery not possible.
4. The total blood loss was measured from suction catheter and the soaked gauze pieces were weighed at the end of the procedure
5. Recovery status was recorded on Modified Aldrete scale
6. Seven point Likert like verbal rating scale for surgeon satisfaction.

Statistical analysis

Data was tabulated using Microsoft Excel 2010 software (Microsoft Office 2010 v14.0) and analyzed with SPSS 15.0 for Windows (SPSS Inc. Chicago. IL, USA). Data is presented as number of patients or median (range). Post-randomization exclusions were analyzed according to intention-to-treat principle. The two groups were compared using student's *t*-test for age, weight, mean arterial pressure, heart rate, amount of blood loss, $ETCO_2$, and SPO_2. Chi-square analysis and Fisher's exact test were used for analysis of gender, ASA physical status, and surgeon's satisfaction after surgery. Statistical significance was determined at $P < 0.05$.

Ethical clearance was obtained from the Institutional Ethics committee as per order INST.EC/EC/116/2014-15.

Results

Fifty patients were allotted into each group. Statistical analysis was performed using SPSS version 15.0 for Windows. The two groups were compared using student's *t* test for age, weight, duration of intubation, mean arterial pressure, heart rate, amount of blood loss, $ETCO_2$, and SpO_2. Chi-square analysis and Fisher's exact test were used for analysis of gender and surgeon's satisfaction after surgery.

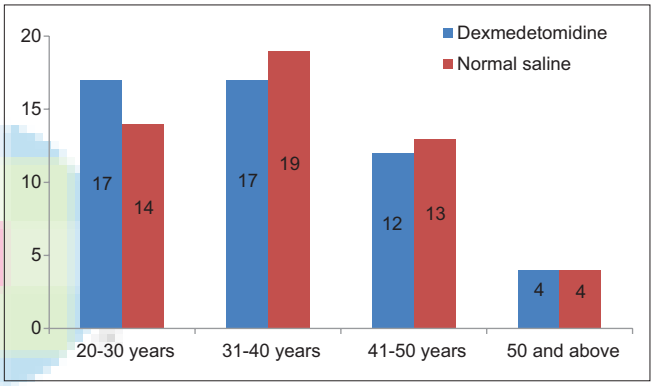

Figure 1: Age distribution of study participants

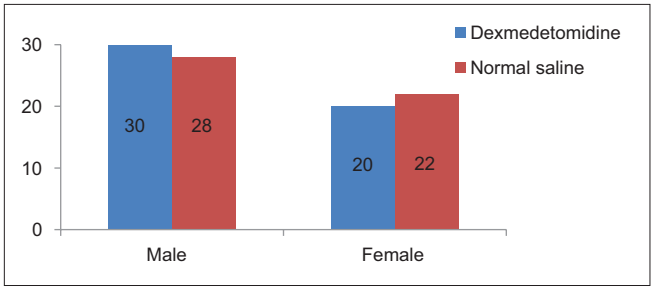

Figure 2: Comparison of the study groups in terms of gender

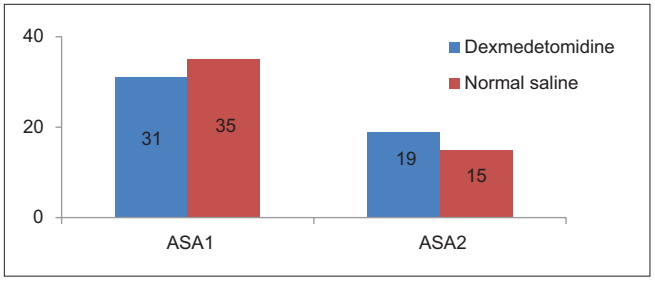

Figure 3: Comparison of ASA status among the study groups

Intraoperative mean arterial pressure and heart rate were plotted with graphs and evaluated. All data are presented as mean ± standard deviation and frequency with percent for categorical data, and statistical significance was determined at $P < 0.05$.

Weight

Both the groups were comparable in terms of weight. There was no significant statistical difference ($P = 0.56$) as shown in Table 1.

Age

The groups were comparable in terms of age. There was no statistical significance (P value of 0.57), as shown in Table 2 and Figure 1.

Sex

There was no significant difference between the groups based on gender (Chi square= 0.1642, P value= 0.685), as shown in Table 3 and Figure 2.

Table 1: Comparison of the groups in terms of mean weight

Group	Mean weight (kg)	N	SD	Significance
Dexmedetomidine	62.36	50	10.66	t=057
Normal Saline	63.7	50	12.54	P=0.56

Unpaired t-test; P=0.56

Table 2: Difference between the groups in terms of age

Group	Mean age (years)	N	SD	Significance
Dexmedetomidine	35.58	50	10.66	t=0.55
Normal Saline	36.88	50	12.54	P=0.57

Unpaired t-test; P=0.57

Table 3: Difference between the groups based on gender

	Males	Females	Total
Dexmedetomidine	30	20	50
NS	28	22	50
Total	58	42	100

Table 4: Difference between the groups based on ASA status

	ASA1	ASA2	Total
Dexmedetomidine	31	19	50
NS	35	15	50
Total	66	34	100

Table 5: Indications for FESS

Indications	Group D	Group NS	Total (%)
Chronic rhinosinusitis	18	22	40 (40)
Pansinusitis	3	2	5 (5)
Nasal Polyp	14	14	28 (28)
Antrochoanal polyp	6	8	14 (14)
Maxillary sinus mucocele	5	3	8 (8)
Sphenoid sinus mucocele	4	1	5 (5)
Total	50	50	100 (100)

ASA

No statistically significant difference was found between the groups with respect to ASA status (Chi square=0.713, P value = 0.398), as shown in Table 4 and Figure 3.

Indications for FESS

Table 5 shows the various indications for FESS with the most common being chronic rhinosinusitis (40%) and nasal

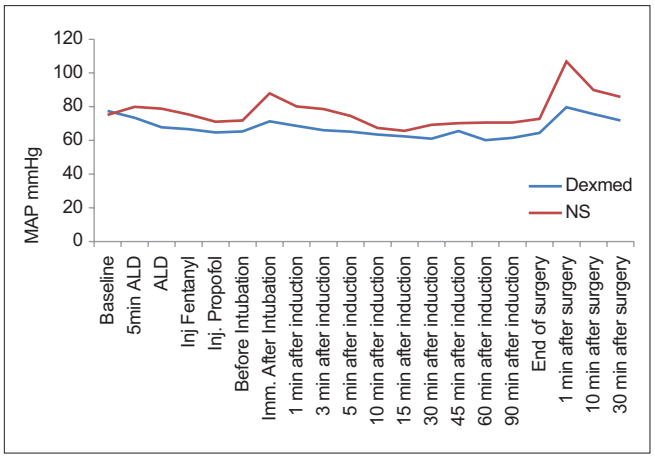

Figure 4: Comparison of MAP between the two groups

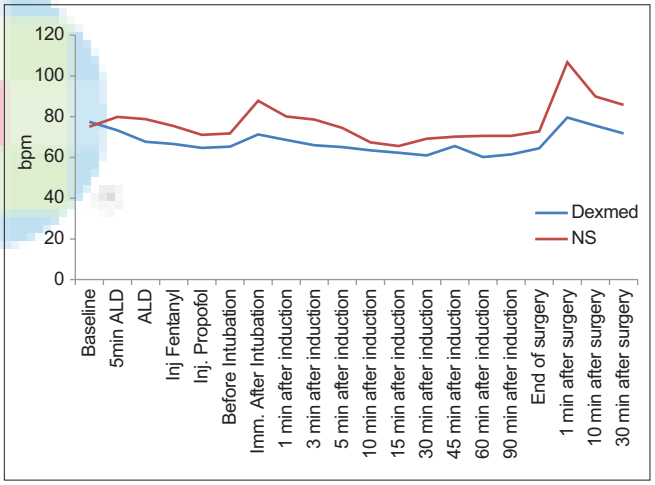

Figure 5: Comparison of heart rate (beats/min) between the two groups

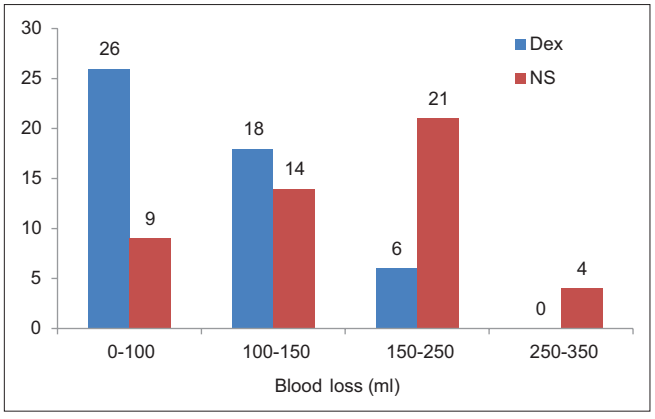

Figure 6: Comparison of blood loss among the groups

Table 6: Mean arterial pressure of the two groups

Time	Group	Mean	SD	*t*	*P*
Baseline	Dexmedetomidine	87.4	17.23	0.071	0.943
	NS	87.66	15.06		
5 min after loading dose	Dexmedetomidine	81.56	14.29	3.82	0.0003
	NS	91.58	11.44		
After loading dose	Dexmedetomidine	75.96	12.24	3.95	0.0001
	NS	86.24	13.67		
Inj. Fentanyl	Dexmedetomidine	72.22	11.15	2.147	0.034
	NS	77.36	12.71		
Inj. Propofol	Dexmedetomidine	68.34	8.19	0.314	0.753
	NS	67.88	6.29		
Before intubation	Dexmedetomidine	67.36	9.96	1.938	0.055
	NS	71.66	12.11		
Immediately after intubation	Dexmedetomidine	72.24	8.51	3.74	0.0003
	NS	82.24	16.87		
After intubation					
1 min	Dexmedetomidine	69.68	9.65	3.73	0.0004
	NS	79.58	15.26		
3 min	Dexmedetomidine	66.9	7.58	3.78	0.0004
	NS	75.68	14.46		
5 min	Dexmedetomidine	66.5	8.83	6.75	<0.00001
	NS	78.46	9.12		
10 min	Dexmedetomidine	62.76	5.47	7.55	<0.00001
	NS	76.32	12.64		
15 min	Dexmedetomidine	64.18	6.18	8.149	<0.00001
	NS	81.3	15.19		
30 min	Dexmedetomidine	63.2	5.20	10.46	<0.00001
	NS	80.18	12.25		
45 min	Dexmedetomidine	63.68	5.73	12.54	<0.00001
	NS	83.06	11.78		
60 min	Dexmedetomidine	66.18	7.01	3.28	0.0019
	NS	79.33	20.76		
90 min	Dexmedetomidine	67.1	4.57	2.56	0.014
	NS	66.18	7.01		
End	Dexmedetomidine	66.2	7.51	9.48	<0.00001
	NS	84.08	15.04		
After extubation					
1 min	Dexmedetomidine	81.54	9.01	14.71	<0.00001
	NS	111.1	12.19		
10 min	Dexmedetomidine	79.3	12.15	7.02	<0.00001
	NS	99.2	13.71		
30 min	Dexmedetomidine	73.78	10.02	5.54	<0.00001
	NS	89.48	14.65		

polyp (28%). Other indications were antrochoanal polyp (14%), maxillary/sphenoid sinus mucocele (13%), and pansinusitis (5%).

Mean arterial pressure

Mean arterial pressure was compared between the groups at every step of the procedure. While the baseline values between the two groups showed no statistical significance; compared to NS, dexmedetomidine was shown to progressively and consistently produce a drop in the mean arterial pressure and having stable vitals throughout the intra and postoperative period with statistically significant difference, as seen in Table 6 and Figure 4.

Heart rate

Heart rate was also found to be comparable between the groups at every step of the procedure. While the baseline values between the two groups showed no statistical significance; compared to NS, dexmedetomidine was shown to produce drop in the heart rate and causing minimal fluctuations during the perioperative period which was statistically significant, as shown in Table 7 and Figure 5.

Oxygen saturation

Mean SpO_2 was found to be maintained well throughout the procedure (mean of 99%) in both dexmedetomidine and control

Table 7: Mean heart rate of the two groups

Time	Group	Mean	SD	*t*-value	*P*
Baseline	Dexmedetomidine	77.46	12.71	−0.97	0.33
	NS	75.1	14.07		
5 min after loading dose	Dexmedetomidine	73.34	10.51	2.59	0.012
	NS	79.9	16.07		
After loading	Dexmedetomidine	67.72	11.02	4.05	0.0001
	NS	78.82	13.38		
Inj. Fentanyl	Dexmedetomidine	66.6	10.09	4.19	0.0001
	NS	75.36	13.13		
Inj. Propofol	Dexmedetomidine	64.72	11.95	3.10	0.003
	NS	71.1	12.08		
Before intubation	Dexmedetomidine	65.26	11.28	3.07	0.003
	NS	71.8	12.87		
Immediately after intubation	Dexmedetomidine	71.28	9.03	7.52	<0.0001
	NS	87.86	12.35		
After induction					
1 min	Dexmedetomidine	68.6	9.98	5.59	<0.0001
	NS	80.14	12.2		
3 min	Dexmedetomidine	65.98	8.52	6.72	<0.0001
	NS	78.6	11.7		
5 min	Dexmedetomidine	65.14	8.96	4.69	<0.0001
	NS	74.52	13.8		
10 min	Dexmedetomidine	63.46	8.5	1.98	0.053
	NS	67.42	13.55		
15 min	Dexmedetomidine	62.32	8.26	1.68	0.09
	NS	65.62	13.24		
30 min	Dexmedetomidine	60.96	8.78	4.49	<0.0001
	NS	69.24	11.26		
45 min	Dexmedetomidine	65.56	9.10	4.72	<0.0001
	NS	70.18	11.25		
60 min	Dexmedetomidine	60.18	8.73	4.10	0.0001
	NS	70.61	8.38		
90 min	Dexmedetomidine	61.5	10.15	2.99	0.004
	NS	70.61	8.38		
End	Dexmedetomidine	64.46	8.06	4.84	<0.0001
	NS	72.8	10.04		
End of surgery					
1 min	Dexmedetomidine	79.64	10.86	11.52	<0.0001
	NS	106.7	13.5		
10 min	Dexmedetomidine	75.58	8.69	6.10	<0.0001
	NS	89.9	16.16		
30 min	Dexmedetomidine	71.78	7.08	6.61	<0.0001
	NS	85.84	13.61		

Table 8: Comparison of saturation levels between the groups (mean values)

	Group D	Group NS	*t*-value	*P*
SpO_2 (%)	99	99	0.216	0.829

group. Thus, there were no significant differences between the two groups, as shown in Table 8.

Hemoglobin and packed cell volume

Hb and PCV levels of all patients were documented before, during, and after surgery; mean levels of which are as documented in Table 9, which was not statistically significant.

Average blood loss during surgery

The average surgical blood loss was found to be 106.1ml in patients of dexmedetomidine group and 152.7 ml in those belonging to the control group. The average intraoperative blood loss was found to be more in the control group and the difference was statistically significant as shown in Table 10 and Figure 6.

Clarity of surgical field

Clarity of surgical field was assessed using the 0-5 point Fromme Scale where 0 signified no bleeding and 5 signified severe

bleeding. In case of dexmedetomidine, clarity was assessed by the operating surgeon as 2 for most (80%) of the cases signifying slight bleeding requiring only occasional suctioning.

However, in case of the control group, surgical field clarity was assessed as 3, i.e., moderate bleeding requiring frequent suctioning for 40% of the cases.

This difference between the two groups was found to be highly significant, as shown in Table 11, and indicates a better clarity of visual field among patients receiving dexmedetomidine compared to the control group.

Surgeon satisfaction based on Likert-like scale

By providing stable vitals throughout the perioperative period, blood loss was well controlled in the dexmedetomidine group, and consequently, surgeon's satisfaction with the operative experience (using the 7-point Likert-like verbal rating scale) was found to be significantly better in the dexmedetomidine group than in the control group, as shown in Table 12 and Figure 7.

Postoperative analgesia and time for first analgesic request

Postoperatively, patients receiving dexmedetomidine did not report pain for a longer period (mean time duration 110 min) whereas the time for first analgesic request for the patients in the control group was much shorter (39.5 min). This was found be statistically significant, as shown in Table 13.

Recovery characteristics

The recovery characteristics of the participants were compared using the Modified Aldrete score [Table 14]. Majority of the patients (68%) in dexmedetomidine group had a score of 9 whereas in the control group, majority (78%) had a score of 8 signifying better recovery characteristics in patients who had received dexmedetomidine.

Discussion

We evaluated the effect of dexmedetomidine on blood loss and quality of surgical field in functional endoscopic sinus surgery.

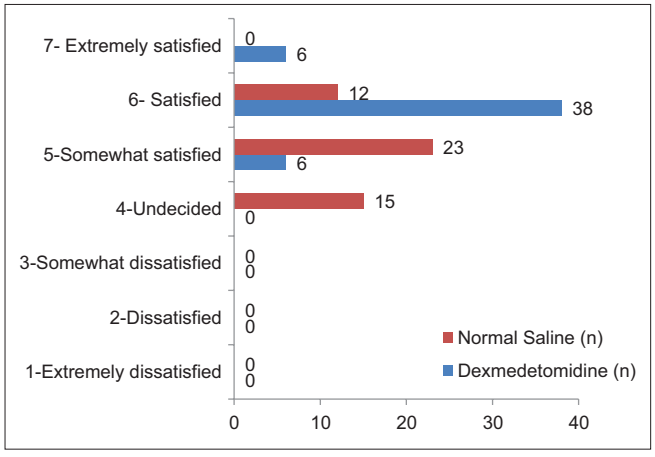

Figure 7: Surgeon satisfaction based on Likert-like scale

Hypotensive effects

In our study, baseline values for heart rate and systolic blood pressure (SBP) were similar between the two groups. Changes observed during intraoperative period were also not clinically significant, except that, the mean heart rate was found to be significantly higher in patients of the control group after extubation whereas patients in the dexmedetomidine group showed hemodynamic stability during this period, with minimal changes in heart rate and SBP. We found that dexmedetomidine provides a stable hypotensive environment throughout the procedure, both during intubation and extubation, when compared to the control group. This is in agreement with studies done by Barak *et al*. and Jamaliya *et al*., where it was found that dexmedetomidine was highly

Table 9: Mean hemoglobin and PCV levels before and after surgery

	Group D			Group NS		
	Mean	*t*-value	*P*	Mean	*t*-value	*P*
Hb (g/dl)						
Presurgery	13.67	0.212	0.416	12.49	1.62	0.053
Postsurgery	13.62			12.11		
PCV (%)						
Presurgery	40.96	0.152	0.439	37.08	1.38	0.085
Postsurgery	40.83			36.13		

P>0.05; not significant

Table 10: Average blood loss during surgery

	Mean blood loss (ml)	SD	*t*-value	*P*
Group D	106.1	36.99	4.59	<0.00001
Group NS	152.7	61.83		

Table 11: Clarity of surgical field according to Fromme Scale

Fromme Scale	Group D (*n*)	Group NS (*n*)	Total
0	0	0	0
1	6	0	6
2	40	20	60
3	4	20	24
4	0	10	10
5	0	0	0
Total	50	50	100

Table 12: Surgeon satisfaction based on Likert-like scale

Likert-like scale	Group D (*n*)	Group NS (*n*)	Total
1-Extremely dissatisfied	0	0	0
2-Dissatisfied	0	0	0
3-Somewhat dissatisfied	0	0	0
4-Undecided	0	15	15
5-Somewhat satisfied	6	23	29
6-Satisfied	38	12	50
7-Extremely satisfied	6	0	6
Total	50	50	100

Table 13: Comparison of time until first analgesic request (mean values)

	Group D	Group NS	*t*-value	*P*
Time until first analgesic request (min)	110	39.5	28.63	<0.0001

Table 14: Recovery characteristics

Modified Aldrete score	Group D	Group NS	Total
7	0	7	7
8	6	39	45
9	34	4	38
10	10	0	10
Total	50	50	100

efficacious as a hypotensive agent in maintaining a target mean arterial pressure, minimizing blood loss and providing better hemodynamic stability.[9,18]

Hemodynamic responses

Before induction, patients had received dexmedetomidine 1 mcg/kg loading dose infusion over 10 min whereas the control group had received the same dose of NS. There was a significant reduction in hemodynamic response in HR and mean arterial pressure following the loading dose of dexmedetomidine, after intubation, and also after extubation ($P < 0.05$) when compared to the control group. This emphasizes that dexmedetomidine provides a stable hemodynamic profile when used as an adjuvant to general anaesthesia. Similar findings were observed in studies by Vora *et al*. and Kol *et al*.[19,20]

Effect on blood loss

Average blood loss during surgery was calculated and compared between the two groups, and was also correlated with hemodynamic variables i.e., mean arterial pressure, heart rate, time taken to emerge from anaesthesia, and the recovery characteristics (using Modified Aldrete score). It was observed that there was significant difference in the amount of perioperative blood loss between the two groups ($P < 0.05$), which was similar to the findings of a study conducted by Vineela *et al*., indicating that dexmedetomidine is superior in reducing blood loss during FESS.[21]

As far as reducing blood loss is concerned, studies conducted separately by Guven *et al*. and Goksu *et al*. who evaluated the effects of dexmedetomidine hydrochloride in terms of hemodynamic parameters, surgeon satisfaction, and patient outcome during functional endoscopic sinus surgery found that, similar to our study, the bleeding, hemodynamic stability, and surgeon satisfaction scores were better in the dexmedetomidine group compared to the control group.[22,23]

In our study, dexmedetomidine was found to help maintain deliberate hypotension at all times of the procedure. Thus, the bleeding score, mean arterial pressure, and heart rate values were significantly decreased in the dexmedetomidine group compared to the control group. Modified Aldrete Modified Aldrete recovery score was also significantly better (≥9) in the group receiving dexmedetomidine ($P = 0.001$), which was also noted in another study by Khalifa *et al*., where dexmedetomidine and magnesium sulfate were compared for their analgesic and sedative effect. Even though both the drugs achieved the target mean arterial pressure (55–65 mmHg), superior hemodynamic stability and lesser emergence time was found only in the dexmedetomidine group.[24]

In our study, we found that, along with stable hemodynamic parameters, dexmedetomidine sedation produces minimal respiratory complication when compared to other frequently used sedatives, such as propofol and midazolam which act as GABA receptor agonists and have hemodynamic and respiratory depressive properties with potential for oversedation; thereby having a higher risk for respiratory depression as stated in a study by Erdurmus *et al*.[25]

Surgeon satisfaction

In our study, because there was a reduction in heart rate and mean arterial pressure, a better surgical field was reported by the operating surgeons in cases receiving dexmedetomidine infusion compared to the control group. This finding was similar to a study done by Yoo *et al*., where they concluded that surgeon satisfaction during surgery was higher in the dexmedetomidine group compared to the control group.[13]

Recovery characteristics

By presynaptic activation of the α_2 adrenoceptor, the release of norepinephrine is inhibited leading to the termination of the propagation of pain signals. However, postsynaptic activation of α_2 adrenoceptors in the central nervous system (CNS) inhibits sympathetic activity and thereby produces a decrease in blood pressure and heart rate. Combining these effects, dexmedetomidine can produce analgesia, sedation, and anxiolysis. In our study, we noted faster and smooth recovery from anaesthesia among patients who received dexmedetomidine when compared to the control group. This finding has been observed in similar such studies in the past, such as the study done by Bayram *et al*., where dexmedetomidine provided better recovery when compared to a control drug.[26] The faster recovery may be explained by better and more stable hemodynamics and prolonged analgesia.

Duration of postoperative analgesia

Dexmedetomidine having a terminal elimination half-life of approximately 2 hours has a longer duration of its analgesic property. This was demonstrated in our study by the prolonged analgesic effect rendered by dexmedetomidine postoperatively in patients who received the drug. Time until first analgesia was much shorter in the control group receiving normal saline.

Conclusion

Our study evaluated the properties and efficacy of dexmedetomidine in reducing the blood loss during FESS by comparing it with a control group. Patients in the dexmedetomidine group showed stable blood pressure levels and heart rate with minimal fluctuations from the

baseline compared to the control group. This hemodynamic stability leads not only to better patient outcome but also increased surgeon satisfaction during surgery by minimizing intraoperative blood loss and improving the clarity of surgical field.

The time taken for emergence from anaesthesia, as indicated by a Modified Aldrete score of >9, was also significantly shorter with dexmedetomidine. There was no significant respiratory depression, oxygen desaturation, or respiratory complications in either of the groups. No complications were encountered in our study. Hence, it is concluded that dexmedetomidine can be safely used in FESS as it effectively reduces the perioperative bleeding and enables a clear surgical field, thereby enhancing surgeon satisfaction and providing minimal complications.

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Conflicts of interest

There are no conflicts of interest.

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